REMARKS

This amendment is submitted for continued examination under new 37 C.F.R. Section 1.114. The fee required under 37 C.F.R. Section 1.17(e) is enclosed.

The specification has been amended to correct an obvious grammatical error.

Claims 1-3 and 9 have been amended. Specifically, Claims 2 and 3 have been amended to include the limitations of Claim 10, which was indicated by the examiner to include patentable subject matter, and Claim 10 therefore has been canceled. (The indication of allowable subject matter in Claim 10 is appreciatively acknowledged.) Method Claims 1-3 and 9 have been amended to recite only a single reference voltage in order to avoid an unintended limitation to the interpretation of those claims. (It is only necessary that a single reference voltage input +REF or a single input +IN be provided on some CDAC analog-to-digital converters.) The amendatory language in Claims 2 and 3 taken from allowable Claim 10 has been changed to clarify that the recited digitized touched first and second points are compared with stored coordinates of the first and second permanently marked points, respectively, to avoid any possible vagueness.

Claims 11-13 have been added, and generally include the limitations of amended Claim 1 and further include additional limitations directed to details of the successive approximation analog-to-digital converter shown in Fig. 2 and coupling thereof to the touch screens and power supply voltages shown in Figure 1.

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For the examiner's convenience, a copy of new claims 11-13 with exemplary reference numerals in brackets is attached hereto as Exhibit 1.

The examiner rejected Claims 1-5 under 35 U.S.C. §103 (a) as unpatentable over Kerth et al.

It is submitted that the above amendment of Claims 2 and 3 to incorporate the subject matter of allowable Claim 10 overcomes the rejection. Claims 4-8 are dependent on amended Claim 3, and therefore also are believed to avoid the rejection.

In his comments, the examiner acknowledged that Kerth et al. do not teach that the second switch [79] is connected directly between the first terminal and the second reference voltage or that the fourth switch [73] is connected directly between the third terminal and the second reference voltage. The examiner stated "However, since both structures (Applicant's device and Kerth's device), perform the same function, omission of an element and its function in a combination is an obvious expedient if the remaining element[s] perform the same function as before", citing In re Nelson, 95 USPQ 82 and In re Eliot, 25 USPQ 111. The examiner then stated: "Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Kerth's device to omit the current DAC (72) since the function of the device will remain the same." [Emphasis added] The rejection is respectfully traversed.

The examiner cites the old In re Nelson and In re Eliot CCPA cases as authority for the position that mere "removal" of an element and its function from a prior art device is obvious if

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(1) the claimed device performs the same function as the prior art device, and (2) the elements of the prior art device that are retained in the claimed device continue to perform the same function that they performed in the prior art device before "removal" therefrom.

However, it is respectfully submitted that the following arguments will show that (1) the claimed touch screen digitizing system does not perform the same function as the Kerth et al. system after (or even before) "removal" of the current DAC and the feedback control circuitry therefrom, and (2) the elements from the Kerth et al. system "retained" in the applicants' claimed touch screen digitizing system do not perform the same functions as in the Kerth et al. system.

The function of the overall Kerth et al. touch screen measurement device is different than the function of the invention recited in Claims 1 and 9. The Kerth et al. touch screen measurement device includes a complex feedback and calibration control system to allow automatic, internal calibration operation that repetitively operates switches 73 and 79 to adjust the output current I_S incrementally until the voltage V_{TX} produced across the Y screen 74 is precisely equal to a reference voltage V_R applied in response to a switch controlled by a signal CAL to the Vin input of an analog-to-digital converter 78. Similarly, switches 79 and 80 are repetitively operated to incrementally adjust another value of the output current I_S until the voltage V_{TX} produced across the X screen 75 is precisely equal to the reference voltage V_R.

Note that provision of the current DAC 72 and the complex feedback system required to accomplish internal self-calibration of the Kerth et al. system would require a very large amount of additional area on an integrated circuit chip and would make the product unreasonably

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expensive.

Furthermore, "removal" of current DAC 72 and the feedback circuitry (see Figure 6 of Kerth et al.) as suggested by the examiner would make the Kerth et al. system completely inoperable unless the remaining elements were connected substantially differently, and operated substantially differently, than is suggested by anything fairly disclosed in the Kerth et al. patent.

Specifically, the Kerth et al. touch screen measurement system also operates switches 73 and 79, switches 76 and 80, and six other switches to measure the x,y coordinates of a touch point at which the stylus presses a touch point of screen 75 against screen 74. The control signals SX and SY control both of the buffers that apply the contents of the SAR registers 91 and 92 to control the current DAC 72 so as to cause it to produce two calibrated values of I_S needed to produce energizing voltages equal to the reference voltage V_R across the X and Y screens 75 and 74, respectively. The control signals SX and SY also control switches 79 and 80, which must be closed every time a measurement of an x coordinate of a touch point is made, and switches 73 and 76, which must be closed every time a measurement of a y coordinate of a touch point is made.

The above described operation for energizing touch screen 74 and 75 and operation of switches 79, 76, 73, and 80 to accomplish the energizing of the screens in order to obtain the x,y coordinates of a touch point of screen 75 pressed by stylus 71 against screen 74 is substantially different than the operation of the switches 18, 19, 20 and 21 shown in applicants' Fig. 1. This is because in the applicants' circuit, the switches 18, 19, 20 and 21 are operated only to connect the

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screen contacts to the two power supply rails, and never are operated to produce the two calibration values of I_S as required by the Kerth et al. system. Specifically, the applicants' switches 18, 19, 20, and 21 operate to energize the x screen 30 and y screen 31 for each x,y screen touch point coordinate measurement for the purpose of applying the same large voltage (i.e., $+V_{CC}$ minus only the two very small voltage drops across either transistors 18 and 19 or transistors 20 and 21) across the x screen or the y screen. The screen edge contacts see the very low impedance of the connecting transistors.

In contrast, in Kerth et al., switches 73 and 76 operate to energize screen 74 by causing a first value of current from the output of current DAC 72 determined by the contents of register 92 to flow through touch screen 74. The output of current DAC 72 is a high impedance output, and is likely to cause the energizing voltage across the x screen and the y screen to be more variable then in the applicants' circuit. Switches 79 and 80 operate similarly to energize touch screen 75 by causing a second value of current determined by the contents of register 91 to flow through touch screen 75. (In contrast, the applicants' transistors 18 and 20 never couple the contacts 50 and 52 of screens 30 and 31 to a high impedance output of a current source such as the Kerth et al. current DAC 72.)

In contrast to the Kerth et al. touch screen measurement system (which performs the above described internal self calibration feature to determine the separate currents I_S and voltages V_{TX} and V_{TY} using all of the illustrated switches (Fig. 6) in a first way and then uses the switches in a second way every measurement cycle to perform measurement of the x,y coordinates of a screen touch point), the applicants' disclosed and claimed invention as defined by Claims 1 and 9

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never performs an internal automatic self calibration function, and therefore never operates the switches for this purpose.

An important result of the differences in the applicants' invention resulting from eliminating the current DAC and internal self-calibration feedback circuitry and operation disclosed in the Kerth et al. reference and providing the direct connections recited in Claims 1 and 9 is that it provides a much less expensive touch screen measurement system which has enjoyed considerable commercial success. This is in sharp contrast to the Kerth et al. system which, to the applicants' knowledge, has enjoyed no commercial success. (If necessary, the applicants can submit evidence of the commercial success and show how the improvement of the claimed invention over the Kerth et al. reference results in the commercial success.)

In view of the above arguments and amendments, it is respectfully submitted that the overall touch screen measurement device defined by Claim 1 functions much differently than any of the touch screen measurement circuits disclosed or suggested by Kerth et al. It also is submitted that the elements "retained" in Claim 1 after removal of the current DAC and feedback circuit from Kerth et al. as suggested by the examiner clearly do not operate the same in the claimed invention as they do in the Kerth et al. circuits with the current DAC and complex feedback circuitry present therein.

Furthermore, "removal" of current DAC 72 and the feedback circuitry as proposed by the examiner (for example as shown in Fig. 6 of Kerth et al.) clearly would make the Kerth et al. system completely inoperable unless the remaining elements were connected substantially

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differently and operated substantially differently than when current DAC 72 and the feedback circuitry are present.

In view of these considerations, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to provide the invention of Claims 1 and 9 in view of anything fairly disclosed in the Kerth et al. reference. Furthermore, it is respectfully submitted that the two old CCPA cases cited by the examiner are not consistent with what the Court of Appeals for the Federal Circuit has consistently held to be the criteria for patentability under 35 U.S.C. §103. That is, the prior art itself must contain a suggestion or motivation which would have made it obvious to one of ordinary skill in the art to provide the invention as claimed. It is respectfully submitted that the Kerth et al. reference, rather than providing a suggestion or motivation to make it obvious to provide the direct connections recited in claims 1 and 9, instead provides the opposite suggestion by describing the disadvantages of providing a direct connection between a touch screen and the positive supply voltage. See the discussion of prior art Fig. 1 in Kerth et al.

The foregoing arguments directed to Claims 1 and 9 are believed to be equally applicable to new Claims 11-13. It is respectfully submitted that the new Claims 11-13 would not have been obvious to one of ordinary skill in the art for the further reasons that the Flowers and Ong in the references contain no teachings of any benefits that would provide any reason or motivation to one of ordinary skill in the art to not only eliminate the complex feedback system of Kerth et al. and provide the direct connections of the resistive screens to the $+V_{CC}$ supply voltage, but to also use a successive approximation type of CDAC analog-to-digital converter as recited in

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claims 7 and 8 and new claims 11-13. The applicants have discovered that this combination of elements that provides the previously unachievable high speed, low-power operation at a sufficiently low cost to make the claimed product successful in the marketplace, whereas the approach of the Kerth et al. reference has not succeeded.

In view of the above amendments and arguments, it is submitted that the application is now in condition for allowance. Entry of the amendment and allowance of the application is respectfully requested.

Respectfully submitted,

CAHILL, SUTTON & THOMAS P.L.C.

Charles R. Hoffman
Registration No. 26,556

2141 East Highland Avenue
155 Park One
Phoenix, Arizona 85016
(602) 956-7000
Docket No. 0437-A-212

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